CLAIMS

      1.   A power line communications ("PLC") device having at least one of communications data transmission and reception capabilities comprises a physical communications protocol layer module adapted for operating in accordance with a

5   plurality of communications signal transmission operating modes, wherein the physical layer module includes:

      a module for performing fourier transform operations, wherein the fourier module is dynamically configurable to perform data processing operations in accordance with a selected communications signal transmission operating mode;

10   a selection module coupled to the fourier transform module, wherein the selection module provides for selection of a communications operating mode for the PLC device from the plurality of communications transmission modes, wherein each of the modes corresponds to a transmission data structure defined in accordance with power line network operating characteristics and communication protocol

15   requirements; and

      a module for converting between parallel and serial symbol data coupled to the selection module, wherein the symbol data converting module processes a transmission data block for the power line network based on the operating mode selected by the selection module.

20   2.   The PLC device of claim 1, wherein the selection module automatically selects the mode based on control data.

      3.   The PLC device of claim 1, wherein the modes include at least one of a wavelet-like filtered and a conventional OFDM-based communications operations modes, and wherein the at least one modes are operable on electric power lines

25   having predetermined operating voltages and frequencies.

      4.   The PLC device of claim 1, wherein the selection module selects a mode based on data obtained from dynamic channel analysis of the power line network.

      5.   The PLC device of claim 1, wherein the selection module selects a mode based on data representative of communications profile requirements of the power

30   line network.

      6.   The PLC device of claim 1, wherein the selection module selects a mode based on data representative of an application profile.

7.   The PLC device of claim 1, wherein the selection module selects a mode based on the size of a symbol corresponding to an identified communications connection oriented profile.

8.   The PLC device of claim 1, wherein a portion of at least one of the fourier transform, selection and data converting modules is implemented using a system on a chip architecture.

9.   The PLC device of claim 8, wherein the PLC device further includes at least one of a module for performing error correction, a module for performing data mapping, an equalization module and a module for converting between serial and parallel data, and wherein a portion of at least one of the error correction module, data mapping module, equalization module and data converting module is implemented using the system on a chip architecture.

10.   The PLC device of claim 1, wherein at least one of the fourier transform, selection and data converting modules is implemented in software.

11.   The PLC device of claim 1, wherein the PLC device further includes at least one of a module for performing error correction, a module for performing data mapping, an equalization module and a module for converting between serial and parallel data, and wherein the at least one module is configurable for performing data processing in accordance with the selected mode.